REMARKS:

1) Enclosed with the Office Action, we have received an acknowledgment copy of our Second IDS Form PTO-1449 of April 2, 2003. We have not yet received an acknowledgment of our first IDS of August 13, 2001. The Examiner is respectfully requested to consider the cited references "AA" to "AD", and to **return an initialed, signed and dated acknowledgment copy of the first IDS Form PTO-1449 of August 13, 2001.**

2) The Examiner's attention is directed to the enclosed Letter to the Official Draftsperson accompanied by a Replacement Sheet of Formal Drawings. Also see the above explanation of the revision of the drawings in the amendment section of this Response. **Entry and approval of the Replacement Sheet of Formal Drawings are respectfully requested.**

3) A few minor clerical and formal amendments have been made in the specification, without introducing any new matter. Entry of the specification amendments is respectfully requested.

4) The claims have been amended as follows.

Claims 1, 2, 7, 10, 13 and 14 have been amended in an editorial and formal manner to avoid informalities and undesired claim style aspects of the original claims, which were essentially a literal translation of corresponding foreign language claims. The amended claims still address the same

subject matter of the original claims and do not introduce any new matter.

Claims 4, 6, 8, 9, 11, 12 and 15 have been canceled.

New claims 16 to 31 have been introduced. The new claims have been drafted "from the ground up" as a fresh approach at covering the inventive subject matter with a somewhat different claim style, format and terminology in comparison to the original literally translated claims. The new claims are supported by the original disclosure as shown in the following table, and do not introduce any new matter.

New Claims	16	17	18	19	20	21	22	23
Original Support	Cl.1; Figs.1,2; pg.3, ln.1-15; pg.5, ln.7-15	Figs.1,2; pg.5, ln.7-15	Fig.1	Fig.1	Fig.1	Fig.1	pg.3, ln.19-32	pg.1, ln.12; pg.2, ln.15-16; pg.3, ln.11-15; pg.4, ln.9-12

New Claims	24	25	26	27	28	29	30	31
Original Support	Cl.2	Cl.2	Figs.1,2	Cl.3	Cl.5; pg.3, ln.24-26; pg.5, ln.20-24,31-35	Cl.7; pg.5, ln.31-35	Cl.10	Cl.14

Entry and consideration of the claim amendments and the new claims are respectfully requested.

5) Referring to the top of page 2 of the Office Action, the objection to the Abstract has been taken into account by rewriting and replacing the Abstract with proper US form and content. Withdrawal of the objection is respectfully requested.

6) Referring to the middle of page 2 of the Office Action, the objection to claims 10 to 12 has been addressed in the amendment of present claim 10. Also, claims 11 and 12 have been canceled. Accordingly, please withdraw the claim objection.

7) Referring to the top of page 3 of the Office Action, the rejection of claims 1 to 15 as failing to comply with the enablement requirement under 35 USC §112, first paragraph is respectfully traversed.

Regarding claim 1, contrary to the Examiner's assertion, the specification does describe how a different modulation index is assigned to different symbols. Also note that the drawings form a part of the original disclosure and description of the invention. See the original specification, e.g. at page 3, lines 1 to 7 and page 5, lines 7 to 20. As explained there, and shown in Figs. 1 and 2, the information symbols (M1, M2, M3 and M4) are respectively modulated onto the carrier signal in successive time intervals, while each of these successive information symbols (M1, M2, M3 and M4) respectively exhibits a different modulation index. Figs. 1 and 2 relate to the example of an amplitude modulation, where it can be clearly seen how the modulation index varies from interval to interval.

A person of ordinary skill in the art readily understands what it means to vary a modulation index, and is also readily able to carry out such variation of a modulation index. For example, see the discussions of amplitude modulation and frequency modulation at the internet web addresses as follows: http://www.rfcafe.com/references/electrical/amplitude_modulation.htm and

http://www.rfcafe.com/references/electrical/frequency_modulation.htm. As is clear from those references, a person of ordinary skill in the art knows that the modulation index (for example in the context of an amplitude modulation) is defined as m = (Vmax - Vmin)/(Vmax + Vmin). Generally, the modulation index defines the modulation variation or swing of the amplitude from a reference value, relative to the reference value. It is thus apparent in present Figs. 1 and 2 that the information symbol M1 represents a 100% modulation index because the carrier signal is completely suppressed to zero, while M2, M3 and M4 respectively represent successive smaller modulation indices as described at page 5, lines 12 to 14.

The original written description further describes additional details about the implementation of the different modulation indices respectively allocated or assigned to different information symbols, for example at page 3, lines 19 to 22 and 26 to 32. The disclosure also makes clear that the different information symbols having different modulation indices assigned thereto may be used to represent different types of information (see e.g. page 1, line 12; page 2, lines 15 to 16; page 3, lines 3 to 15; page 4, lines 9 to 12; etc.). From these disclosures, a person of ordinary skill in the art would have been readily enabled to carry out the inventive feature of assigning different modulation indices to the individual information symbols.

Regarding claim 5, contrary to the Examiner's assertion, the specification expressly does describe how two information symbols can be transmitted simultaneously. For example, see page 3,

lines 24 to 26. Also see the further explanation that plural different forms of information symbols can be superimposed on one another, and thus transmitted simultaneously. For example, a further information symbol (Mt) such as a clock information may be superimposed on one of the other information symbols defined by its assigned modulation index, such as (M2) (page 5, lines 14 to 24). As another example, the signal period length or duration (T0 and T1) may be varied from period to period, in order to thereby represent another form of information symbol that can also convey associated information (page 5, lines 31 to 35). Thus, the information symbol represented by the duration or length of the respective modulation period is also superimposed and transmitted simultaneously with the information symbols (e.g. M1, M2, M3, M4) making up this modulation period. From these disclosures, a person of ordinary skill in the art would have readily understood and would have been enabled to carry out the simultaneous transmission of plural information symbols according to present claim 5.

Regarding claim 7, contrary to the Examiner's assertion, the specification does expressly teach how the period length or duration can be varied in order to transmit an additional information symbol. In this regard see the above discussion with reference to claim 5, and particularly see the specification at page 5, lines 31 to 35 as well as Fig. 2 of the drawings. Also see page 3, line 34 to page 4, line 3. The period length can be varied simply by providing shorter-duration information symbols or fewer information symbols between successive field gaps of the signal, as shown in Fig. 2, whereby the duration of the period

itself then conveys additional information from the first transceiver to the second transceiver. From these disclosures, a person of ordinary skill would have been readily enabled to carry out the features of present claim 7.

In view of the above discussed original disclosures of the present application, it is respectfully submitted that a person of ordinary skill in the art would have been readily enabled to make and/or use the invention as now defined in the amended claims. Accordingly, the Examiner is respectfully requested to withdraw the rejection of claims 1 to 15 under 35 USC §112, first paragraph.

8) Referring to the bottom of page 3 of the Office Action, the rejection of claims 14 and 15 as indefinite under 35 USC §112, second paragraph has been addressed in the present amendment. Claim 14 is now directed to a method like its parent claim, and claim 15 has been canceled. Accordingly, claim 14 is now clear and definite, and the Examiner is respectfully requested to withdraw the rejection under 35 USC §112, second paragraph.

9) Before particularly addressing the prior art rejections and comparing the present claims to the prior art disclosures, the invention will first be discussed in general terms to provide a background.

The invention of present claim 1 is directed to a method of transmitting plural information symbols between first and second transceivers. The method involves <u>assigning a different modulation index to each one of plural information symbols</u> and

then modulating the information symbols onto a carrier signal in accordance with the different modulation indices assigned respectively to the symbols, by accordingly modulating a characteristic physical variable (e.g. the amplitude, frequency, or phase) of the carrier signal.

By assigning different modulation indices to the various information symbols, in effect the respective modulation index itself conveys additional information from the first transceiver to the second transceiver. Thus, the different information symbols having different modulation indices assigned thereto can represent different types of information to be transmitted, whereby the assigned modulation index identifies the type of information for example (see the specification, for example at page 1, line 12; page 2, lines 15 to 16; page 3, lines 11 to 15; page 4, lines 9 to 12; etc.). The second transceiver that receives the modulated signal can detect and uniquely identify the respective modulation index assigned to each respective information symbol, and thus derives additional information from this detected modulation index (see e.g. page 3, lines 19 to 22; page 4, lines 1 to 6; etc.). This allows the total amount of information, i.e. the total data rate, transmitted from the first transceiver to the second transceiver to be increased.

Thus, rather than transmitting information only in the encoded data words (e.g. encoded patterns and groups of modulation pulses), the present invention can transmit additional information in further aspects of the signal. For example, the modulation index of the respective information symbol may identify what type of data is being transmitted, e.g. a

temperature, a pressure, a speed, etc. Then, the modulation itself, e.g. the data encoding, represents a numerical value of the indicated type of information. For example, the encoded data may represent a particular numerical value of the temperature, pressure, speed, etc. Thus, without requiring additional data to be encoded in longer or additional data words, the second transceiver is now able to determine not only the numerical value, but also the type of information (e.g. a temperature, pressure, speed, etc.) given by the numerical value. As a very basic example, note that Fig. 1 shows four successive information symbols (M1, M2, M3, M4) having different numbers and patterns of modulation pulses respectively. Thus, the number and pattern of pulses in each information symbol can represent the encoded data value.

Furthermore, additional information such as a control signal information, e.g. a clock signal (Mt), can be superimposed on the transmitted signal. As shown in Figs. 1 and 2, the clock signal (Mt) may, for example, be represented by the rising flank of a pulse of a respective information symbol. Thus, the second transceiver can be clocked by this received clock signal (Mt) and does not require its own local clocking signal generator. Still further, the modulated signal may include modulation periods between successive field gaps (information symbol M1 with 100% modulation index, i.e. suppression of the signal). The transmitted succession of periods (T0, T1) having different durations can transmit still further information from the first transceiver to the second transceiver. In other words, the period length itself represents additional information.

Thus, the inventive method involves a new way of packing more information into a transmitted signal, and thereby achieving a higher data rate. The basic key aspect of this method is assigning a different modulation index respectively to plural information symbols and then modulating the information symbols onto the carrier signal in accordance with the different modulation indices.

While it is generally conventionally known to provide different modulation indices for different transmission conditions (e.g. for different data rates or different channel transmission qualities), it is not conventionally known and would not have been obvious to assign different modulation indices **individually** to plural **information symbols** in a given transmission.

10) Referring to page 4 of the Office Action, the rejection of claims 1, 2 and 3 as obvious over PCT Publication WO 99/33237 (Piirainen et al.) is respectfully traversed.

As generally discussed above, a key feature of the invention set forth in present independent claim 1 is that a different modulation index is assigned to each one of plural **information symbols**, and the symbols are modulated onto a carrier signal in accordance with the different modulation indices assigned respectively to the information symbols.

As recognized and acknowledged by the Examiner, Piirainen et al. "*does not disclose assigning different modulation indices to different symbols*". Quite distinctly, as also recognized by the Examiner, Piirainen et al. instead disclose assigning

different modulation indices to different **data rates**, i.e. whereby the modulation index depends on the data rate (see Abstract; page 2, lines 9 to 10 and 15 to 16; page 3, lines 21 to 23; page 4, lines 1 to 3; page 8, lines 4 to 6; etc.). Thus, Piirainen et al. expressly link the modulation index to a particular **data rate** and **NOT** to an **information symbol** (see page 3, lines 21 to 23). The express purpose for this according to Piirainen et al. is to allow the data rate to be changed depending on the quality or transmission condition of the transmission channel, or depending on a desired or required data rate, for example because a low modulation index will not be suitable for a low-quality transmission channel because noise or interference in the channel will lead to difficulties and errors in the evaluation of the received signal with a low modulation index (see page 3, line 32 to page 4, line 3). For this reason, a high modulation index must be used in a low-quality transmission channel, because the high modulation index can be more easily separated and distinguished from interference and the like. That would not have had any pertinence to the inventive assignment of different indices to respective information symbols.

Namely, all of those considerations of Piirainen et al. have nothing to do with the inventive feature of assigning a different modulation index to each one of plural **information symbols** in a transmission. For example, the present inventive method will assign different modulation indices to different information symbols in a given transmission that maintains the same consistent data rate (contrary to Piirainen et al.). On the

other hand, the method according to Piirainen et al. will only assign different modulation indices when different data rates are involved, and will then assign the same modulation index to all of the information symbols being transmitted at a given data rate (contrary to the present invention). There would have been no suggestion toward assigning different modulation indices to different information symbols.

Further specifically, Piirainen et al. disclose that there are two data symbols (e.g. a digital 0 and a digital 1). Both of those data symbols are modulated with the same modulation index for a given transmission with a given data rate (page 4, lines 12 to 27).

The present claims do not extend to cover the general concept of changing a modulation index. Rather, the present claims are specifically limited to assigning a different modulation index to each one of plural information symbols in a transmission. That is a distinct and significantly different concept from the concept of Piirainen et al. in which "the modulation index used is changed according to the data rate of the signal to be transmitted" (see page 8, lines 5 and 6 of the reference, underlining added).

While Piirainen et al. change the modulation index according to the data rate without regard to the information symbols being transmitted, the present invention is directly contrary and involves changing the modulation index depending on the information symbol to be transmitted without regard to the data rate. Thus, the actual teachings and suggestions of Piirainen et al. would have guided a person of ordinary skill in the art

directly away from the present invention, because Piirainen et al. make clear that the modulation index shall only be changed according to the data rate and without regard to the information symbols.

The Examiner has blankly asserted "*However, one skilled in the art would clearly recognize to apply the teaching of Piirainen to assign different modulation indices to different symbols*", without any support in the prior art whatsoever. What motivations would have existed in the prior art to modify the teachings of Piirainen et al. to essentially replace the term (and concept) "data rate" by the different term (and concept) "information symbol"? That is what the Examiner is proposing. It appears that the Examiner's assessment may have been improperly influenced by hindsight reasoning of a retrospective understanding of the present invention applied to the prior art reference. Based on the actual teachings of the reference, a person of ordinary skill in the art would have had no motivation to proceed as proposed by the Examiner. To the contrary, even any attempt to incorporate the inventive features in the teachings of Piirainen et al. would have been irrational and unreasonable. While the inventive method switches the modulation index from symbol to symbol. according to Piirainen et al. that would have resulted in a different data rate for each individual symbol, which is an irrational and non-sensical result.

The dependent claims 2 and 3 are already patentably distinguishable over the prior art in view of their dependence from claim 1.

For these reasons, the invention would not have been obvious over Piirainen et al., and the Examiner is respectfully requested to withdraw the rejection of claims 1 to 3.

11) Referring to the top of page 5 of the Office Action, the rejection of claims 11 and 12 as obvious over Piirainen et al. in view of US Patent 6,771,694 (Baumgartner) is respectfully traversed. Claims 11 and 12 have been canceled. However, remaining claim 10 recites similar subject matter as claims 11 and 12, but had not been rejected on prior art grounds. Also, claim 10 depends from claim 1 which has been discussed above in comparison to Piirainen et al. The additional disclosure of Baumgartner would not have supplemented any of the above-discussed deficiencies of Piirainen et al., because Baumgartner neither discloses nor would have suggested the present inventive features of assigning a different modulation index to each one of plural information symbols and then modulating the symbols onto a carrier signal in accordance with the different modulation indices that have been assigned to the symbols. Thus, even a combination of the teachings of the two references would not have suggested the present invention. The Examiner is respectfully requested to withdraw the obviousness rejection applying Piirainen et al. in view of Baumgartner.

12) The new claims 16 to 31 also patentably define the present invention over the prior art. New independent claim 16 recites steps of assigning different modulation indices respectively individually to plural information symbols, representing

information items with the information symbols, modulating the information symbols onto a carrier signal in accordance with the different modulation indices respectively assigned to the information symbols, and then transmitting the resulting modulated signal from a first device to a second device. As generally discussed above, the prior art references do not disclose and would not have suggested such steps, because the references are devoid of any suggestion relating to the key inventive feature of assigning different modulation indices respectively to plural information symbols.

13) It is further noted that original claims 4 to 10 and 13 to 15 had not been rejected on prior art grounds, and the rejections under 35 USC §112 have been addressed as discussed above. Accordingly, these claims should now also be allowable.

14) Favorable reconsideration and allowance of the application, including all present claims 1 to 3, 5, 7, 10, 13, 14 and 16 to 31, are respectfully requested.

Respectfully submitted,

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Encls.:
postcard, Form PTO-2038,
Letter to Draftsman,
1 Annotated Sheet of drawings,
1 Replacement Sheet of Formal Drawings

CERTIFICATE OF MAILING:
I hereby certify that this correspondence with all indicated enclosures is being deposited with the U. S. Postal Service with sufficient postage as first-class mail, in an envelope addressed to: COMMISSIONER FOR PATENTS, P.O. BOX 1450, ALEXANDRIA, VA 22313-1450 on the date indicated below.

Walter F. Fasse 2/23/05

Name: Walter F. Fasse - Date: February 23, 2005

In the Drawings:

Please replace the single sheet of original drawings with the enclosed single Replacement Sheet. The reference character "Mt" has been added in the left or first modulation period "T0" in both Figs. 1 and 2, consistent with the second or right modulation period shown in each of these figures, and in conformance with the original written description at page 5, lines 20 to 24 and 33. Thus, the insertion of this reference character does not introduce any new matter. Entry and approval of the Replacement Sheet of Formal Drawings are respectfully requested.

[RESPONSE CONTINUES ON NEXT PAGE]